Subject: Chemistry, Class: XII, Max. M. = 70, Time: 3 h

GENERAL INSTRUCTIONS

i) All questions are compulsory.
ii) Marks for each question are indicated from (iii) to (vi) instructions.
iii) Q. No. 1 – 8 are very short answer question, carrying 1 marks each. Answer these in one word or about one sentence each.
iv) Q. No. 9- 18 are short answers questions, carrying 2 marks each. Answer in about 30 words each.
v) Q. No.19 - 27 are also short answers questions, carrying 3 marks each. Answer in about 40 words each.
vi) Q. No. 28 – 30 are long answers questions of 5 marks each. Answer these in about 70 words each.
vii) Use log tables if necessary. Use of calculators is not permitted

1. Give one example of broad spectrum antibiotic?

2. Write IUPAC name of the following compound: CH_3—CO—CH (NO_2)—CH_2—OH

3. What is denaturation of proteins?

4. Which one is more acidic and why, among formic acid and acetic acid?

5. Why N_2 exist as gas while P_4 exist as solid?

6. Why is Zn not extracted from ZnO through reduction using CO?

7. Why a finely divided substance is more effective as an adsorbent?

8. A group 14 element is to be converted into p-type semiconductor by doping. To which group should this impurity belong?

9. States 'Henry's law' and mention at least one important application?

10. The reaction, $2A + B \rightarrow A_2B$, Rate = k [A] $[B]^2$ with k = 2×10^{-6} $mol^{-2}litre^2s^{-1}$
Calculate the initial rate of the reaction when [A] = 0.1mole L^{-1}, [B] = 0.2 mol L^{-1}.

OR

Prove that time required for the 99% completion of reaction is double the time required for 90% for the 1^{st} order reaction.

11. Write short note on (i) froth flotation process (ii) leaching

12. Complete the following equations:
(I) $PCl_3 + H_2O \rightarrow$ (ii) $Al_2O_3 + NaOH + H_2O \rightarrow$

13. Why Cr^{2+} is reducing & Mn^{3+} is oxidizing when both have same d^4 configuration?

14. Explain why:

    (i) Dipole moment of chloro-benzene is lower than of cyclohexyl chloride?
    (ii) Alkyl halides are insoluble in water, though they are polar in nature?

15. Arrange the compounds of each set in order of reactivity towards SN^2 reactions:

    (i) 2-bromo-2-methylbutane, 1-bromopentane, 2-bromopentane
    (ii) 1-bromo-3-methylbutane, 2-bromo-2-methylbutane, 3-bromo-2-methylbutane

16. Write the equations involved in the following reactions:

    (I) Riemer - Tiemann reaction
    (ii) Kolbe's reaction

17. Give two reactions that show the acidic nature of phenol.

18. What are food preservatives? Gives two examples.

19. (a) Explain the difference between Buna-N & Buna-S.
    (b) Arrange the following polymers in increasing order of their molecular forces:
    (i) Nylon-6 6, Buna-S, Polythene
    (ii) Nylon-6, Neoprene, Polyvinyl Chloride

20. What happens when D-Glucose is treated with the following reagents?
    (i) HI (ii) Bromine water (iii) HNO_3

21. Give the structure of A, B & C:

    (i) $CH_3CH_2Br \xrightarrow{KCN} A \xrightarrow{LiAlH_4} B \xrightarrow{HNO_2} C$

    (ii) $CH_3COOH \xrightarrow{NH_3} A \xrightarrow{NaOBr} B \xrightarrow{NaNO_2/HCl} C$

    (iii) $C_6H_5NO_2 \xrightarrow{Fe/HCl} A \xrightarrow{HNO_2/273K} B \xrightarrow{C_6H_5OH} C$

22. (i) Explain the geometry of $[Co(NH_3)_6]Cl_3$ on the basis of VB theory.
    (ii) Give one example of ambidentate ligand.

23. Give reasons:
    (i) d block elements have high heat of atomization
    (ii) d block elements act as better catalyst
    (iii) d block elements forms interstitial compounds

OR

Explain with reason
(i) Ni^{2+} is formed but not Ni^{4+} .
(ii) Cu^{+} is not stable in aqueous solution.
(iii) Ce^{4+} is stable while lanthanides have stable +3 oxidation states.

24. Find the order of the reaction & also rate constant from the data given for the following equation, $2A + 3B \rightarrow 2D$

Rate	[A] $molL^{-1}$	[B] $molL^{-1}$
$2x\ 10^{-6} molL^{-1}s^{-1}$	0.1	0.1
$4 \times 10^{-6}\ molL^{-1}s^{-1}$	0.1	0.2
$3.2 \times 10^{-5}\ molL^{-1}s^{-1}$	0.4	0.1

25. (i) Explain the variation of chemical adsorption with temperature at constant pressure.
(ii) difference between macromolecular and micro-molecular colloids.
(iii) Hardy Schulze's rule.

26. (i) What is Van't Hoff factor for $K_3[Fe(CN)_6]$?
(ii) Calculate the degree of dissociation for $MgSO_4$ if aqueous solution of 1 m concentration represents boiling point 100.832 C^0. Molal elevation constant for water is 0.52 K Kg Mol^{-1}.

27. Calculate the density of NaCl crystal where the distance between the Na^+ & Cl^- is 281 pm. It is found that 1.5×10^{23} constituents are present in 14.62 g of the crystal.

28. (a).Explain the following: (i) Cannizzaro's Reaction
(ii) Wolf Kishner's Reaction
(iii) Cross Aldol Condensation
(b) Give chemical test to distinguish between
(i) CH_3CHO and C_6H_5CHO (ii) CH_3COCH_3 & $CH_3CHOHCH_3$

29. (a) Explain the construction & working of Pb storage cell.

(b) (i) Explain Kohlrausch's law.
(ii) Calculate amount of Ni deposited when a constant current of 5 ampere flown through the electrolytic solution of $Ni(NO_3)_2$ for 40 minute.

30. (a) How are XeO_3 & $XeOF_4$ prepared?

(b) Explain (i) PCl_3 act as a oxidizing agent as well as reducing agent.
(ii) Di-oxygen is gas but sulphur is a solid.
(iii) $R_3P=O$ exist but $R_3N=O$ does not.

OR

(a) Write balance equation for the following:
(i) Sodium chloride is heated with sulphuric acid in the presence of manganese dioxide.
(ii) Chlorine gas is passed into a solution of sodium iodide in water

(b) Explain with reason
(i) why is He used in diving apparatus?

(ii) All the 5 bonds in PCl_5 are not equivalent.
(iii) F exhibit only -1 O.N. whereas other halogens exhibit +1, +3, +5 & +7 O.N.

Blue Print

Class: XII

S. No.	Name of unit	1 marks	2 marks	3 marks	5 marks	Total marks
1	Solid state	1		3		4
2	Solutions		2	3		5
3	Electrochemistry				5	5
4	Chemical kinetics		2	3		5
5	Surface chemistry	1		3		4
6	Metallurgy	1	2			3
7	p-block elements	1	2		5	8
8	d-block elements		2	3		5
9	Coordination chemistry			3		3
10	Halogen derivatives		2, 2			4
11	Alcohol, phenol and ether		2, 2			4
12	Aldehydes, ketones and acids	1			5	6
13	Organic compounds containing N	1		3		4
14	Biomolecules	1		3		4
15	Polymers			3		3
16	Chemistry in daily life	1	2			3
	Total	8 (8)	20 (10)	27 (9)	15 (3)	70 (30)

MARKING SCHEME

1	Chloroamphenicol or any other example.
2	4-Hydroxy-3-nitrobutan-2-one.
3	Meaning of denaturation
4	HCOOH is more acidic than CH_3COOH. This is because CH_3 group has + I effect and releases electrons towards COOH group.
5	Due to small size, N can form $p\pi - p\pi$ bonds and it exist as a discrete small molecule and hence gas. P being large in size, cannot form $P\pi$- $P\pi$ bonds, exist as a network solid.
6	$ZnO(s) + CO(g) \rightarrow Zn(s) + CO_2(g)$. There is almost no change in entropy and reaction is endothermic. Hence, it is thermodynamically unfavourable.
7	Because of large surface aera
8	Group 13
9	Definition and any one limitation
10	Rate = $k[A][B]^2 = 2 \times 10^{-6} \times 0.1 \times (0.2)^2 = 8 \times 10^{-9}$ mol L^{-1} sec^{-1}
11	definition
12	H_3PO_3 and $2\ Na[Al(OH)_4]$
13	Cr^{2+} by losing one electron change to Cr^{3+} which is more stable while Mn^{3+} by gaining one electron changes to stable Mn^{2+}.
14	In chlorobenzene, Cl is bonded to sp^2 hybrid orbital which is more electronegative than C of cyclohexyl chloride which is sp^3 hybrid. They are unable to break H bond in water and develop new bonds.
15	1-Bromopentane > 2-Bromopentane > 2-Bromo-2-methylbutane and 1-Bromo-3-methylbutane > 3-Bromo-2-methylbutane > 2-Bromo-2-methyl butane
16	Correct reactions
17	Reaction with (i) Na metal (ii) NaOH with balanced equation
18	Definition and suitable examples.
19	In Buna-N, one monomer is $CH_2 = CH - CH = CH_2$ and other is $CH_2 = CH - CN$ while in Buna-S, one monomer is $CH_2 = CH - CH = CH_2$ and other is $CH_2 = CH - C_6H_5$.
20	n-Hexane, Gluconic acid and Saccharic acid
21	A = CH_3CH_2CN, B = $CH_3CH_2CH_2NH_2$ and C = $CH_3CH_2CH_2OH$ A = CH_3CONH_2, B = CH_3NH_2 and CH_3OH A = aniline, B = diazonium salt and C = Azo dye
22	Explanation based on VBT. Example of ambidentate ligand is CN^- and NC^-.
23	Strong metallic bonding is responsible for high heat of automisation. Large surface aera, variable oxidation state, vacant d-orbitals are responsible for being catalyst. The size of voids left in the close packing of d-block elements are almost same as those of non-

	metal atoms of C, H, B et. OR The high I. E. and low thermodynamic stability is responsible for non existence of Ni^{4+}. Cu^{+} undergoes disproportionation reaction which is spontaneous as: $2\ Cu^{+} \rightarrow Cu^{2+} + Cu$. Due to stable noble gas configuration.
24	Rate = $k\ [A]^2[B]$ and $k = 2 \times 10^{-3}$
25	The chemical adsorption first increases with rise in temperature and then decreases with further rise. Macromolecular colloid is obtained by breaking bigger particles while micrmolecular colloid is obtained by the association of smaller ones. The coagulating power of effective ion is directly proportional to the fourth power its valency.
26	$K_3[Fe(CN)_6] \rightarrow 3\ K^{+} + [Fe(CN)_6]^{4-}$. n = 4 and i = 4. $\Delta T_b = i \times k_b \times m$. i = 1.6 and α = 60 %.
27	On substituting the value in $d = Z \times M / a^3 \times N_A$, d = 2.165 g/cm^3.
28	Carbonyl compound without α H in the presence of base gives salt of carboxylic acid and alcohol. Carbonyl compound + NH_2NH_2 / base gives hydrocarbon. Two different carbonyl compound, one having α H in the presence of base gives β-hydroxy carbonyl compounds as product. Iodoform test and Brady's reagent respectively.
29	Explanation about lead storage battery. Statement of law. W = atomic weight of Ni x 5 x 40 x 60 / 2 x 96500 = 3.65 g
30	$XeF_6 + 3\ H_2O \rightarrow XeO_3 + 6\ HF$ and $XeF_6 + H_2O \rightarrow XeOF_4 + 2\ HF$. The oxidation number of P is in between – 3 and + 5 in PCl_3. Due to small size, O can form $p\pi - p\pi$ bonds and it exist as a discrete small molecule and hence gas. S being large in size, cannot form $P\pi$- $P\pi$ bonds, exist as a network solid. Due to absence of d-orbital, N cannot form $R_3N = O$ bot P has d-orbitals, it can show penta covalency. OR $4\ NaCl + MnO_2 + 4\ H_2SO_4 \rightarrow MnCl_2 + 4\ NaHSO_4 + 2\ H_2O + Cl_2$. $Cl_2\ (g) + 2\ NaI\ (aq) \rightarrow 2\ NaCl\ (aq) + I_2\ (s)$. Very low solubility of He in blood. The three equatorial bonds repels two axial bonds to greater extent. F_2 is strongest oxidizing agent as well as it has no d-orbitals.